GUJARAT TECHNOLOGICAL UNIVERSITY
MCA – SEMESTER – IV• EXAMINATION – SUMMER 2018

Subject Code: 2640003   **Date:24/05/2018**

Subject Name: Operations Research (OR)

Time:10.30 am to 01.00 pm   **Total Marks: 70**

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** What is Operations Research? Briefly explain the Applications of OR in various fields.   **07**

(b) Solve using the Graphical method the following problem: **07**

Maximize $Z = 3x + 2y$
subject to: $2x + y \leq 18$
$2x + 3y \leq 42$
$3x + y \leq 24$
$x \geq 0 , y \geq 0$

Q.2 **(a)** Solve using the simple method: **07**
Maximize $z = 3x1 + 2x2$
subject to
$-x1 + 2x2 \leq 4$
$3x1 + 2x2 \leq 14$
$x1 - x2 \leq 3$

$x1, x2 \geq 0$

(b) Solve the following LPP using Big M Method.   **07**

Minimize $Z = 3x1 + x2$
Subject to constraints
$4x1 + x2 = 4$ ....(i)
$5x1 + 3x2 \geq 7$ ....(ii)
$3x1 + 2x2 \leq 6$ ....(iii)
Where x1 , x2≥0.

OR

(b) What is linear programming? Give the mathematical model of linear programming problem. Briefly explain with an example.   **07**

Q.3 **(a)** Describe the characteristics of calling population (input source) of a queuing System. What do you understand by Queue discipline?   **07**

(b) Determine an initial Basic feasible solution to the following Transportation Problem by using (a) Least Cost Method (b)Vogel Approximation Method.   **07**

	D1	D2	D3	D4	Supply
S1	11	13	17	14	250
S2	16	18	14	10	300
S3	21	24	13	10	400
Demand	200	225	275	250	

Q.3 **(a)** Explain Errors and Dummies in network diagram with suitable figure. **07**

(b) What do you mean by unbalanced transportation problem and unbalanced assignment problem? How can you convert them into balanced problem? **07**

Q.4 **(a)** A company makes bicycles. It produces 450 bicycles a month. It buys the tires for bicycles from a supplier at a cost of $20 per tire. The company's inventory carrying cost is estimated to be 15% of cost and the ordering is $50 per order. **07**
        a.Calculate the EOQ
        b.What is the number of orders per year?
        c.Compute the average annual ordering cost.
        d.Compute the average inventory.
        e.What is the average annual carrying cost?
        f.Compute the total cost.

(b) Define simulation. Explain various stages involved in simulation process. **07**

OR

Q.4 **(a)** Write the mathematical form of transportation. Represent assignment problem as a special case of transportation problem. **07**

(b) Discuss the various costs involved in an inventory model. **07**

Q.5 **(a)** A mill owner finds from his past records the costs of running a machine whose purchase price is Rs.6000 are as given below **07**

Year	1	2	3	4	5	6	7
Running cost(Rs)	1000	1200	1400	1800	2300	2800	3400
Resale value (Rs)	3000	1500	750	375	200	200	200

Determine at what age is a replacement due?

(b) Explain its advantages and disadvantages of simulation. **07**

OR

Q.5 **(a)** (1) Define the following terms: **07**
(i)Payoff matrix (ii) saddle point (iii) two-person zero-sum game (iv) competitive game

(b) Briefly Explain the structure of Queuing system. **07**

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